ENVIRONMENTAL HEALTH PERSPECTIVES OF A PANCHAYAT IN IDUKKI DISTRICT OF WESTERN GHATS

1.1 INTRODUCTION

The term environment connotes the sum of all living and non-living things that surround an organism, or group of organisms. It is the sum of all social, economical, biological, physical or chemical factors which constitute the surroundings of man, who is both creator and moulder of his environment (Sharma, 2001). Within the context of environmental health, 'environmental' pertains to 'all that which is external to the human host, including physical, biological, social and cultural aspects, any or all of which can influence the health status of populations' (Last, 2001).

Exposure to environmental conditions at the limit of organism's tolerance range represents environmental stress. Man's efforts to control nature have upset the equilibrium of the environment resulting in destructive effects. One-third of the world's productive land is significantly damaged by erosion, compaction, water logging and salination and chemical destruction of organic content. Countries with large rural populations continue to suffer from traditional environmental risks such as indoor smoke from domestic cooking and heating with solid fuels, unsafe water supply, inadequate sanitation and poor hygiene.

The key to man's health is his environment. In fact, much of man's ill-health can be traced to adverse environmental factors such as water pollution, soil pollution, air pollution, poor housing conditions, presence of animal reservoirs and insect vectors.

1.1.1. Environment and Human Health

The relationship between human health and the environment is complex (Corvalan *et al.*, 1999). Environmental health is concerned with environmental factors that influence or directly affect human health either positively or negatively (Corvalan *et al.*, 1999). The World Health Organization (WHO,1994) defined environmental health as 'those aspects of human health, including quality of life, that are determined by chemical, physical, biological, social and psychosocial factors in the environment'. As environment deteriorates, so does the physical and mental health of the people who live in them. If parts of the environment, like air and water or soil become polluted, it can lead to health problems.

The factors which are fundamental to individual and community health are water, air, ventilation, light, noise, radiation, meteorological environment and housing, disposal of wastes and excreta. Environmental health matters greatly to those living in poverty and directly affects the quality of life of those belonging to the poor income group (Miller, 2004; World Bank, 2006).

1.1.2 Environmental Health Risks

Environmental health risks are factors that relate to the natural world and the impact of human activity in its condition that increase the chance of disease or injury. Environmental health risks are grouped into two broad categories - traditional hazards and modern hazards. Traditional hazards refer to health risks that are consequence of lack of access to clean water, inadequate sanitation, poor waste disposal, indoor air pollution and vector-borne diseases. Modern hazards are related to rapid development that lacks health and environment safeguards and to unsustainable consumption of natural resources (Smith, 1990; Corvalan *et al.* 1999). These hazards include water pollution from populated areas, industry, and intensive agriculture; urban air pollution from automobiles, coal power stations, and industry; solid and hazardous waste accumulation; chemical and radiation hazards due to introduction of industrial and agricultural technologies; emerging and re-emerging infectious disease hazards; deforestation, land degradation, and other major ecological changes at local and regional level; climate change; stratospheric ozone depletion; and transboundary pollution (Corvalan *et al.*, 1999).

1.1.3 Environment Health Indicators

An environmental health indicator can be defined as an expression of the link between environment and health, targeted at an issue of specific policy or management concern and presented in a form which facilitates interpretation for effective decision-making (Corvalan *et al.*, 1999). Indicators are divided into three broad areas of environmental health: water, air, and chemical/physical agents. An ideal indicator is one which can be measured, monitored over time, has a linkage between environment and health, is tied to public health objectives, and relates to existing standards, among other attributes. Environmental health indicators should be valid, measurable, accurate and sensitive to changes in the environment that affect human health, and data to compute the indicator should be available.

Major indicators of environmental health are outdoor and indoor air quality, water quality, toxics and wastes, healthy homes, healthy communities and good infrastructure.

1.1.4 Mountain Ecosystem

A total of about half a billion people live in uplands and mountains. Mountain ecosystems encompass a range of shapes, climates and compositions of vegetation and animal species depending on elevation and latitude. Half of the world's population depends on mountain water. All the major rivers of the world originate in mountains that receive high levels of precipitation as rain.

1.1.5 The Western Ghats

The Western Ghats, also known as the Sahyadri Mountains, is a mountain range along the western side of India. The average elevation is around 1,200 meters. The whole area of Western Ghats is 159,000sq.km, of which forest cover is about one third. The forest in the Western Ghats has been severely fragmented due to human interference. Complex and species-rich habitats like the tropical rainforest are much more adversely affected than other habitats. During the past 40 to 50 years the plant and animal life has suffered due to development and urbanization, which has led to the extinction of many species and more are in danger of becoming extinct.

1.2 SIGNIFICANCE OF THE STUDY

The grandeur of mountain ecosystems belies their delicacy. Thin soils and slope instability raise the vulnerability of mountains to human disturbances and require lengthy recovery time. Persistent abuse usually leads to irreversible degradation. Unfortunately the environment has been persistently abused in many parts of high-land areas for thirty years or more. From the Andes to the Himalayas, and from Southeast Asia to East and Central Africa, there is serious ecological deterioration.

Nedumkandom - a high range panchayath from Western Ghats in Idukki district of Kerala is undergoing aggressive developmental activities. The inevitable result of development is environmental degradation. This panchayath is facing serious environmental health issues due to unscientific developmental as well as agricultural activities. The quality of water and soil is deteriorating and many people are affected by water borne diseases every year. The number of patients suffering from asthma and cancer show a steady increase. Moreover the high range area is under threat of variations in climate. Nature can be very forgiving - though not indefinitely. Very few studies have been conducted regarding environmental quality and its influence on human health in high range areas. The present study is a preliminary attempt to provide

information about the general environmental quality of the Nedumkandom Panchayath and its influence on human health.

1.3 OBJECTIVES:

The aim of the work was to assess the environmental health of the study area by analyzing the different parameters that controls and contributes to the proper wellbeing of the human being by controlling the environment itself. This aim was accomplished through achieving three main objectives:

1) To monitor the environment quality of Nedumkandam Panchayath with special reference to air and water.
2) To study the relationship between prevalence of asthma and the quality of indoor and outdoor air
3) To study the relationship between prevalence of waterborne diseases and quality of water in the study area
4) To assess the relationship between land use/land cover changes and environmental health of Nedumkandam Panchayath

1.4 RESEARCH DESIGN, STUDY AREA AND METHODOLOGY

1.4.1 Research Design

- Survey of the entire study area on the prevalence of respiratory allergy, using a standardized questionnaire.
- Dust sampling from the indoor environment and assessment of the occurrence of fungal spores.
- Monitoring of air quality of the study area, using high volume air sampler.
- Survey on the prevalence of water borne diseases
- Assessment of the water quality in the study area, including ground water and surface water
- Assessment of the land use/land cover changes in Nedumkandam Panchayath
- Correlating the results with special reference to environmental degradation and its impact on human health

1.4.2 Study Area

Nedumkandam, is the major town of Udumbanchola taluk in Idukki district of Kerala state in India with a history of less than four decades. It is located in between the Periyar wild life reserve in Thekkady and the hill station of Munnar in the upland region of Western Ghats. The study area is enclosed between Latitudes $9^0$48'00"to $9^0$52'00" North and Longitude 77^o06'00 to 77^0 15'00" East, covering an area of 71.95 Km^2 (Map 1). It is bounded by Udumbanchola panchayath at north, Pampadumpara panchayath at south, Tamil Nadu state at east, Irattayar and Vathikudi panchayaths at west.

1.4.3 Methodology

An outline of the methodology envisaged is given below.

- **Survey on the prevalence of respiratory allergy in the study area**

  A questionnaire based survey was used to determine the prevalence of respiratory allergy among the population of Nedumkandam Panchayath.

- **Assessing the ambient air quality of the study area**

  Ambient air quality was determined using a high volume air sampler followed by standard procedures (APHA)

- **To study the occurrence of fungal spores in the houses of asthmatic patients.**

  Occurrence of fungal spores in the houses of asthmatic patients was studied by collecting indoor house dust samples followed by standard procedures.

- **To assess the Physico-chemical parameters of water in the study area**

  Physico-chemical water quality was analyzed through bimonthly sampling of surface water as well as ground water followed by standard procedures (APHA).

- **To assess the microbial quality of the water with special reference to fecal coliform, fecal streptococci and *Escherichia coli***

  Microbial water quality was analyzed through bimonthly sampling of surface water as well as ground water followed by standard procedures (APHA).

- **Information on water born diseases**

  Information on water born diseases was collected from the records of nearby hospitals in Nedumkandam Panchayath.

- **Assessing the land use/land cover changes of the study area**

The land use/land cover changes for the past 34 years in Nedumkandom panchayath was studied with the help of Remote Sensing and GIS techniques.

1.5 ORGANIZATION OF THESIS

The structure of this thesis broadly corresponds to the chronological order that was adopted throughout the research, which also relates to the objectives listed previously.

- Chapter I deals with general introduction in its wider context, scope of the study, objectives, methodology and description of study area.
- Chapter 2 covers general air quality, quality of housing and indoor allergens prevalent in the study area. Particular attention is focused on the survey data sets and its statistical analysis.
- Chapter 3 presents the assessment of water quality and spatial modeling using Geographical Information System (GIS).
- Chapter 4 explains the land use - land cover dynamics of the study area and its significance in environmental health of the area.
- Chapter 5 summarizes the major conclusions and recommendations culminating this study.

1.6 CONCLUSION

The grandeur of mountain ecosystems belies their delicacy. Unfortunately the environment has been persistently abused in many parts of Nedumkandom for last thirty years or more. This panchayath is facing serious environmental health issues due to unscientific developmental as well as agricultural activities. Significant changes in the land use/land cover pattern may be the reason for deteriorating environmental quality in the study area. Deteriorated environmental quality have resulted various health issues among the inhabitants of Nedumkandam panchayath.

Present study was a preliminary attempt to provide information about the general environmental quality of Nedumkandom Panchayath and its influence on human health. Further detailed studies are required to collect in depth data regarding various environmental aspects for implementing plans for the eco-restoration and sustainable development of the study area.